10/709,114

IN THE CLAIMS:

Please amend the claims in the application as follows:

1. (Original) A bipolar transistor comprising:

a patterned isolation region formed below an upper surface of a semiconductor substrate; and

a single crystal extrinsic base formed on an upper surface of said isolation region.

2. (Original) The bipolar transistor of claim 1, wherein said single crystal extrinsic base comprises a portion of said semiconductor substrate located between said upper surface of the isolation region and said upper surface of the semiconductor substrate.

3. (Original) The bipolar transistor of claim 1, further comprising a single crystal intrinsic base, wherein a portion of said single crystal extrinsic base merges with a portion of said single crystal intrinsic base.

4. (Original) The bipolar transistor of claim 1, wherein said isolation region electrically isolates said single crystal extrinsic base from a collector.

5. (Original) The bipolar transistor of claim 4, wherein said single crystal intrinsic and extrinsic bases separate said collector from an emitter.

6. (Original) The bipolar transistor of claim 1, wherein said single crystal extrinsic base comprises epitaxially-grown silicon.

7. (Original) The bipolar transistor of claim 1, wherein said isolation region comprises an insulator, and wherein said insulator comprises oxide.

8. (Original) The bipolar transistor of claim 1, wherein said isolation region comprises any of a shallow trench isolation region and a deep trench isolation region.

9. (Original) A bipolar transistor comprising:

a semiconductor substrate;

a sub-collector in said semiconductor substrate;

a collector adjacent said sub-collector;

a patterned isolation region encapsulated within said semiconductor substrate;

a single crystal extrinsic base over said isolation region; and

an emitter adjacent said single crystal extrinsic base.

10. (Original) The bipolar transistor of claim 9, wherein said single crystal extrinsic base comprises a portion of the semiconductor substrate located between an upper surface of the isolation region and an upper surface of the semiconductor substrate.

11. (Original) The bipolar transistor of claim 9, further comprising a single crystal intrinsic base, wherein a portion of said single crystal extrinsic base merges with a portion of said single crystal intrinsic base.

12. (Original) The bipolar transistor of claim 9, wherein said isolation region electrically isolates said single crystal extrinsic base from said collector.

13. (Original) The bipolar transistor of claim 12, wherein said single crystal intrinsic and extrinsic bases separate said collector from said emitter.

14. (Original) The bipolar transistor of claim 9, wherein said single crystal extrinsic base comprises epitaxially-grown silicon.

15. (Original) The bipolar transistor of claim 9, wherein said isolation region comprises an insulator, and wherein said insulator comprises oxide.

16. (Original) The bipolar transistor of claim 9, wherein said isolation region comprises any of a shallow trench isolation region and a deep trench isolation region.

17. (Original) A method of forming a bipolar transistor, said method comprising:

forming a patterned isolation region below an upper surface of a semiconductor substrate; and

forming a single crystal extrinsic base on an upper surface of said isolation region.

18. (Original) The method of claim 17, wherein said single crystal extrinsic base comprises a portion of the semiconductor substrate located between said upper surface of the isolation region and said upper surface of the semiconductor substrate.

19. (Original) The method of claim 17, further comprising forming said single crystal intrinsic base over said semiconductor substrate, wherein a portion of said single crystal extrinsic base merges with a portion of said single crystal intrinsic base.

20. (Original) The method of claim 17, wherein said isolation region electrically isolates said single crystal extrinsic base from a collector.

21. (Original) The method of claim 20, wherein said single crystal intrinsic and extrinsic bases separate said collector from an emitter.

22. (Original) The method of claim 17, wherein said single crystal extrinsic base comprises epitaxially-grown silicon.

23. (Original) The method of claim 17, wherein said isolation region comprises an insulator, and wherein said insulator comprises oxide.

24. (Original) The method of claim 17, wherein said isolation region comprises any of a shallow trench isolation region and a deep trench isolation region.

25. (Original) A method of manufacturing a bipolar transistor, said method comprising:

performing an oxygen implant to form a patterned isolation layer underneath a substrate surface;

forming a single crystalline intrinsic base over said substrate;

depositing insulator layers over said single crystalline intrinsic base;

selectively etching portions of said insulator layers to expose portions of said single crystalline intrinsic base; and

forming a single crystalline extrinsic base over exposed portions of said single crystalline intrinsic base.

26. (Currently Amended) <u>A method of manufacturing a bipolar transistor, said method comprising:</u>

<u>performing an oxygen implant to form a patterned isolation layer underneath a substrate surface;</u>

forming a single crystalline intrinsic base over said substrate;

depositing insulator layers over said single crystalline intrinsic base;

selectively etching portions of said insulator layers to expose portions of said single crystalline intrinsic base;

forming a single crystalline extrinsic base over exposed portions of said single crystalline intrinsic base; ~~The method of claim 25, further comprising:~~

converting any polycrystalline portions and a portion of said single crystalline extrinsic base of said bipolar transistor into oxide by performing a high pressure oxidation process over said single crystalline extrinsic base;

removing excess portions of said oxide; and

forming an oxide isolation layer over said single crystalline extrinsic base by performing a second high pressure oxidation process over said single crystalline extrinsic base.

27. (Currently Amended) A method of manufacturing a bipolar transistor, said method comprising:

performing an oxygen implant to form a patterned isolation layer underneath a substrate surface;

forming a single crystalline intrinsic base over said substrate;

depositing insulator layers over said single crystalline intrinsic base;

selectively etching portions of said insulator layers to expose portions of said single crystalline intrinsic base;

forming a single crystalline extrinsic base over exposed portions of said single crystalline intrinsic base;

converting any polycrystalline portions and a portion of said single crystalline extrinsic base of said bipolar transistor into oxide by performing a high pressure oxidation process over said single crystalline extrinsic base;

removing excess portions of said oxide; and

forming an oxide isolation layer over said single crystalline extrinsic base by performing a second high pressure oxidation process over said single crystalline extrinsic base, ~~The method of claim 26, wherein~~ said insulator layers comprise a silicon nitride layer deposited over a silicon dioxide layer.

28. (Currently Amended) A method of manufacturing a bipolar transistor, said method comprising:

performing an oxygen implant to form a patterned isolation layer underneath a substrate surface;

forming a single crystalline intrinsic base over said substrate;

depositing insulator layers over said single crystalline intrinsic base;

selectively etching portions of said insulator layers to expose portions of said single crystalline intrinsic base;

forming a single crystalline extrinsic base over exposed portions of said single crystalline intrinsic base;

converting any polycrystalline portions and a portion of said single crystalline extrinsic base of said bipolar transistor into oxide by performing a high pressure oxidation process over said single crystalline extrinsic base;

removing excess portions of said oxide;

forming an oxide isolation layer over said single crystalline extrinsic base by performing a second high pressure oxidation process over said single crystalline extrinsic base, said insulator layers comprise a silicon nitride layer deposited over a silicon dioxide layer; ~~The method of claim~~ 27, further comprising:

removing remaining portions of said silicon nitride layer;

forming a pair of isolation spacers adjacent a sidewall of said single crystalline extrinsic base and said oxide isolation layer and over said silicon dioxide layer;

removing exposed portions of said silicon dioxide layer unprotected by said isolation spacers thereby exposing said single crystalline intrinsic base; and

defining an emitter region over said single crystalline intrinsic base.

29. (Original) The method of claim 25, wherein said single crystalline extrinsic base comprises a portion of the substrate located between an upper surface of the patterned isolation layer and an upper surface of the substrate.

30. (Original) The method of claim 25, wherein a portion of said single crystalline extrinsic base merges with a portion of said single crystalline intrinsic base.